What Is Claimed Is:

1. A device for the analysis of a sample plate (12), on
    which at least two material samples (13) are disposed,
    including a carrier (28) for the sample plate (12) and
    contacting means for the electrical contacting of the
    material samples (13),
    characterized by a measuring head (26), insertable in a
    housing carrier (27), which includes two measuring wires
    (30A, 30B) per material sample (13) for the electrical
    connection to the contacting means, which lie against the
    contact surfaces of the sample plate (12) with
    prestressing, and are connected to a measuring and
    evaluation unit (18).

2. The device as recited in Claim 1,
    wherein the measuring wires (30A, 30B) lie against the
    contact surfaces of the sample plate (12) via fusion
    balls (31A, 31B).

3. The device as recited in Claim 1 or 2,
    wherein the measuring wires (30A, 30B) are each connected
    to a spring contact (32A, 32B) which ensures a constant
    contact pressure of the respective measuring wire (30A,
    30B) on the respective contact surface.

4. The device as recited in one of Claims 1 through 3,
    wherein the measuring head (26) is connected to a gas
    supply unit (16).

5. The device as recited in Claim 4,
    wherein the gas supply unit (16) is connected to a data
    processing unit (53) of the measuring and evaluation unit
    (18).

6. The device as recited in Claim 4 or 5,
    wherein the gas supply unit (16) includes a gas mixing

32

device.

7. The device as recited in one of Claims 4 through 6, wherein the gas supply unit (16) includes a water reservoir (46).

8. The device as recited in one of Claims 4 through 7, wherein the measuring head (26) includes a gas chamber, formed preferably by an essentially bell-shaped distributing device (39), for applying gas to the sample plate (12), which is connected to the gas supply unit (16).

9. The device as recited in Claim 8, wherein a diffuser is situated in the gas chamber (42).

10. The device as recited in Claim 8 or 9, wherein the gas chamber is furnished with a gas outlet which is preferably formed by at least one spacer (43), which is situated between the sample plate (12) and the distributing device (39).

11. The device as recited in one of Claims 1 through 10, wherein the measuring and evaluation unit (18) includes two relay switch panels (50, 51) which are connected to the measuring wires (30A, 30B) and preferably each have a 3x64 matrix made up of high-frequency suitable relays.

12. The device as recited in one of Claims 1 through 11, wherein the measuring and evaluation unit (18) includes an impedance analyzer (64).

13. The device as recited in one of Claims 1 through 12, wherein the measuring and evaluation unit (18) is equipped with a measuring and control software which passes obtained or derived measured data to a relational databank that is preferably linked to an evaluation

33

software.

14. The device as recited in Claim 13,
    wherein the evaluation software includes a fit
    functionality for calculating theoretical impedance
    spectra for the individual material samples, the
    calculation preferably taking place based on a circuit
    equivalent (90), which includes at least one electronic
    component.

15. The device as recited in Claim 13 or 14,
    wherein the evaluation software includes a datamining
    functionality.

16. The device as recited in Claim 15,
    wherein the datamining functionality works by the
    application of preferably multidimensional target
    functions.

17. The device as recited in one of Claims 14 through 16,
    wherein the datamining functionality includes a
    visualizing functionality.

18. The device as recited in one of Claims 1 through 17,
    characterized by a heating device (22), into which the
    sample plate (12) is preferably able to be inserted.

19. A method for the analysis of a sample plate (12), on
    which at least two material samples are disposed,
    including the following steps:

    - measuring an impedance spectrum for each of the
    material samples;
    - storing the measured impedance spectra in a data file
    or a databank;
    - determining the design of a circuit equivalent as a
    function of the respectively measured impedance spectrum

34

for each of the material samples, the respective circuit equivalent including at least one electronic component, especially at least one resistor and/or at least one RC element;

- determining a starting value required for an error minimization computation for the components of the respective circuit equivalents;

- calculating a theoretical impedance spectrum for at least one of the material samples, using the error minimization computation based on the impedance spectrum measured for this material sample, as well as on the starting values for the components of the respective circuit equivalent;

- determining fit values for the components of the respective circuit equivalent;

- determining a validation magnitude for the calculated, theoretical impedance spectrum;

- determining an evaluation variable by the comparison of at least one of the fit values for the components to a reference value.

20.   The method as recited in Claim 19,
wherein a number of RC elements connected in series is determined while taking into consideration a preferably preselectable threshold value, preferably, maximally four RC elements being selected.

21.   The method as recited in Claim 19 or 20,
wherein the starting values for the components of a first RC element of the circuit equivalent are ascertained as a function of the maximally measured, imaginary impedance Z''_MAX, a starting resistance $R1\_START$ and a starting capacitance $C1\_START$ being calculated.

22.   The method as recited in one of Claims 19 through 21,

35

wherein the error minimization computation is carried out by variation of the dimensioning of the individual components of the circuit equivalent by, preferably, 1%.

23. The method as recited in one of Claims 19 through 22, wherein in the error minimization computation, an error of the theoretical impedance spectrum is ascertained by the analysis of the difference from the measured impedance spectrum.

24. The method as recited in one of Claims 19 through 23, wherein for each of the material samples, impedance spectra are measured under various test gas atmospheres and preferably at various temperatures.

25. The method as recited in one of Claims 19 through 24, wherein the evaluation variable for each material sample is written into a databank, and a datamining is carried out in the light of the evaluation variables stored in the databank.

26. The method as recited in Claim 25, wherein the datamining is carried out using a target function.

27. The method as recited in Claim 26, wherein the datamining is carried out using a visual datamining functionality.

28. The method as recited in one of Claims 19 through 27, wherein the measured impedance spectra are visually checked and/or evaluated using a control functionality.

29. A data processing installation having a program for carrying out a method as recited in one of Claims 19 through 27.

36